भारतीय मानक
Indian Standard

IS 4591 (Part 1/Sec 3) : 2020

स्वचालित सीढ़ियाँ और चलपथ

भाग 1 / अनुभाग 3 निरीक्षण एवम जाँच

(पहला पुनरीक्षण)

Escalators and Moving Walks

Part 1 / Section 3 Inspection and Test

(First Revision)

ICS 91.140.90

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Lift and Escalators Sectional Committee, ETD 25

FOREWORD

This Indian Standard (Part 1/Sec 3) (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Lift and Escalators Sectional committee had been approved by the Electrotechnical Division Council.

This standard contains extracts of "EN 115 : 1995 + A1 : 1998 + A2 : 2004 Safety rules for the construction and installation of escalators and passenger conveyors" reproduced with the permission of CEN.

This standard was first published in 1968. There has been tremendous increase in usage of escalators during the past decade. Considering that escalators are being used by many without much of knowledge of its operation, it is necessary that safety aspects are taken care in the manufacturing of escalators. Keeping this in view and also toalign the requirements with international practices, this standard is being revised and is being brought out in three sections as follows:

IS 4591 (Part 1/Sec 1) : 2020	Escalators and moving walks: Part 1/Section 1 Safety requirements (*first revision*)
IS 4591 (Part 1/Sec 2) : 2020	Escalators and moving walks: Part 1/Section 2 Guide for planning and selection (*first revision*)
IS 4591 (Part 1/Sec 3) : 2020	Escalators and moving walks: Part 1/Section 3 Inspection and Test (*first revision*)

With the publication of these standards, IS 4591 : 1968 stands withdrawn.

The objective of this standard is to provide requirements for electric escalators and moving walks that carry passengers.

The purpose of this standard is to define safety requirements for escalators and moving walks in order to safeguard people and objects against accidental risks during installation, operation, maintenance and inspection work.

The contents of this standard are based on the assumption that persons using escalators and moving walks are able to do so unaided. However, physical and sensory abilities in a population can vary over a wide range, escalators and moving walks are also likely to be used by persons with a range of other disabilities.

Some individuals, in particular older people, might have more than one impairment. Some individuals are not able to use an escalator or moving walk independently and rely on assistance/support being provided by a companion. Furthermore, some individuals can be encumbered by objects or be responsible for other persons, which can affect their mobility. The extent to which an individual is incapacitated by impairments and encumbrances often depends on the usability of products, facilities and the environment.

The use of wheelchairs on escalators and moving walks can lead to dangerous situations which cannot be mitigated by machine designs and therefore should not be permitted.

The use of lifts is the preferred method of vertical travel for most people with disabilities and in particular wheelchair users and persons with guide dogs.

Additional signs should be provided to indicate the location of other facilities, these facilities should be in close proximity to the escalators and moving walks and easy to find.

It is assumed that negotiations have been made for each contract between the customer and the supplier/installer about:

a) intended use of the escalator or moving walk;
b) environmental conditions;
c) civil engineering problems; and
d) other aspects related to the place of installation.

If escalators or moving walks are intended to be operated under special conditions, such as, directly exposed to the weather or explosive atmosphere, or in exceptional cases serve as emergency exits, appropriate design criteria, components, materials and instructions for use should be used that satisfy the particular conditions.

(*Continued on third cover*)

Indian Standard

ESCALATORS AND MOVING WALKS

PART 1 / SECTION 3 INSPECTION AND TEST

(First Revision)

1 SCOPE

1.1 This standard (Part 1/Sec 3) is applicable for all new escalators and moving walks (pallet or belt type) as defined in **3**.

This standard deals with Inspection and Test of Escalators and Moving Walks as included in **4**.

1.2 This standard does not deal with hazards arising from seismic activities.

1.3 This document is not applicable to escalators and moving walks which were manufactured before the date of its publication. It is, however, recommended that existing installations be adapted to this standard.

2 REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

IS No.	*Title*
4591 (Part 1/ Sec 1) : 2020	Escalators and moving walks: Part 1/Sec 1 Safety requirements
4591 (Part 1/ Sec 2) : 2020	Escalators and moving walks: Part 1/Sec 2 Guide for planning and selection

3 TERMS AND DEFINITIONS — SYMBOLS AND ABBREVIATIONS

3.1 Terms and Definitions

For the purposes of this standard, the terms and definitions given below shall apply.

3.1.1 *Angle of Inclination* — Maximum angle to the horizontal in which the steps, the pallets or the belt move.

3.1.2 *Balustrade* — Part of the escalator/moving walk which ensures the user's safety by providing stability, protecting from moving parts and supporting the handrail.

3.1.3 *Balustrade Decking* — Transverse member of the balustrade which meets the handrail guidance profile and which forms the top cover of the balustrade.

3.1.4 *Brake Load* — Load on the step/pallet/belt which the brake system is designed to stop the escalator/ moving walk.

3.1.5 *Comb* — Pronged section at each landing that meshes with the grooves.

3.1.5.1 *Comb plate* — Platform at each landing to which the combs are attached.

3.1.6 *Electrical Safety System* — Safety related part of the electrical control system as an arrangement of safety circuits and monitoring devices.

3.1.7 *Electrical Safety Devices* — Part of a safety circuit consisting of safety switches and/or fail safe circuits.

3.1.8 *Escalator* — Power-driven, inclined, continuous moving stairway used for raising or lowering persons in which the user carrying surface (for example, steps) remains horizontal.

NOTE — Escalators are machines even when they are out of operation, and cannot be considered as fixed staircases.

3.1.9 *Exterior Panel* — Part of the exterior side of the enclosure of an escalator or moving walk.

3.1.10 *Fail Safe Circuit* — Safety related electrical and/or electronic system with defined failure mode behavior.

3.1.11 *Handrail* — Power-driven moving rail for persons to grip while using the escalator or moving walk.

3.1.12 *Interior Panel* — Panel located between the skirting or lower inner decking and the handrail guidance profile or balustrade decking.

3.1.13 *Decking*

3.1.13.1 *Lower inner decking* — Profile that connects the skirting with the interior panel when they do not meet at a common point.

3.1.13.2 *Lower outer decking* — Profile that connects the exterior panels with the interior panel.

3.1.14 *Machinery — E*scalator or moving walk machine(s) mechanisms and associated equipment.

3.1.15 *Machinery Spaces* — Space(s) inside or outside of the truss where the machinery as a whole or in parts is placed.

3.1.16 *Maximum Capacity* — Maximum flow of persons that can be achieved under operational conditions.

3.1.17 *Moving Walk* — Power-driven installation for the conveyance of persons in which the user carrying surface remains parallel to its direction of motion and is uninterrupted (for example, pallets, belt).

NOTE — Moving walks are machines, even when they are out of operation and, should not be used as a fixed access.

3.1.18 *Newel* — End of the balustrade.

3.1.19 *Nominal Speed* — Speed in the direction of the moving steps, pallets or the belt, when operating the equipment under no load condition (that is, without persons), stated by the manufacturer as that for which the escalator or moving walk has been designed.

NOTE — Rated speed is the speed the escalator/moving walk moves under rated load conditions.

3.1.20 *Rated Load* — Load which the equipment is designed to move.

NOTE — For maximum capacity, *see* **4.1** of IS 4591 (Part 1/Sec 2).

3.1.21 *Rise* — Vertical distance between the upper and lower finished floor levels.

3.1.22 *Safety Circuit* — Part of the electric safety system consisting of electrical safety devices.

3.1.23 *Skirting* — Vertical part of the balustrade interfacing with the steps, pallets or belt.

3.1.24 *Skirt Deflector* — Device to minimise the risk of trapping between the step and the skirting.

3.1.25 *Stand-by Operation* — Mode in which an escalator/moving walk can be stopped or operated under no load condition with any speed below the nominal speed.

4 INSPECTION AND TEST

4.1 General

Escalators and moving walks shall be inspected before their first use, after major modifications and at regular intervals. Such inspections and tests should be made by a competent person.

4.2 Constructional Inspection and Acceptance Inspection and Test

The constructional inspection and acceptance inspection and test shall be carried out at the job-site on completion of the escalator or moving walk.

For the constructional inspection and acceptance inspection and test, the data specified in **6.2** of IS 4591 (Part 1/Sec 1) should form part of a pre-completed test sheet. Furthermore, layout drawings, description of the equipment and wiring diagrams (current flow chart with legend or explanations, and a terminal connection chart) which permit a check of compliance with the safety requirements specified in this standard, shall be provided.

The constructional inspection comprises the examination of the completed installation for conformity with the required data and with regard to proper workmanship as specified in this standard.

The acceptance inspection and test comprises:

a) overall visual inspection (*see* Annex A);

b) functional test;

c) test of electric safety devices with regard to their effective operation; and

d) test of the brake(s) of the escalator or moving walk under no load, for compliance with the prescribed stopping distances [*see* **5.4.2.1.3.2** and **5.4.2.1.3.4** of IS 4591 (Part 1/Sec 1)]. An examination of the brake adjustment according to the calculation required in 6.2 c) of IS 4591 (Part 1/Sec 1) is also necessary.

   Additionally, for escalators, a test of the stopping distances under brake load [*see* **5.4.2.1.3.2** of IS 4591 (Part 1/Sec 1)] is required unless the stopping distances can be verified by other methods; and

e) measurement of the insulation resistance of the different circuits between conductors and earth [*see* **5.11.1.4** of IS 4591 (Part 1/Sec 1)]. For this measurement, the electronic components shall be disconnected.

This needs to include a test of the electric continuity of the connection between the earth terminal(s) in the driving station and the different parts of the escalator or moving walk liable to be live accidentally.

4.3 Inspection and Test after Major Modifications

A major modification is a change of the location, speed, electric safety devices, braking system, drive, control, step band, truss and balustrades. Wherever applicable, the principles set forth for the constructional inspection and acceptance inspection and test (*see* **4.2**) should apply to the new environmental conditions, modified components and other components which are affected.

The replacement of parts by parts of same design is not considered to be a major modification.

ANNEX A

[*Clause* 4.2 (a)]

A-1 CHECK LIST FOR INSPECTION OF ESCALATOR/MOVING WALK AT SITE

		OK	**Not OK**	**NA**
1	**Escalator/Moving Walk – External**			
1.1	General Fire Protection	☐	☐	☐
1.2	Geometry	☐	☐	☐
1.3	Handrails	☐	☐	☐
1.4	Entrance and exit ends	☐	☐	☐
1.5	Lighting	☐	☐	☐
1.6	Caution signs	☐	☐	☐
1.7	Combplate	☐	☐	☐
1.8	Deck barricade	☐	☐	☐
1.9	Steps/Pallets and upthrust device	☐	☐	☐
1.10	Operating devices	☐	☐	☐
1.11	Skirt obstruction devices	☐	☐	☐
1.12	Handrail-speed monitoring device	☐	☐	☐
1.13	Speed	☐	☐	☐
1.14	Balustrades	☐	☐	☐
1.15	Ceiling intersection guards	☐	☐	☐
1.16	Step/pallet/skirt clearance panels and performance index	☐	☐	☐
1.17	Outdoor protection	☐	☐	☐
2	**Escalator/Moving Walk – Internal**			
2.1	Machinery space access, lighting, receptacle and condition	☐	☐	☐
2.2	Stop switch	☐	☐	☐
2.3	Controller and wiring	☐	☐	☐
2.4	Drive machine and brake	☐	☐	☐
2.5	Speed governor	☐	☐	☐
2.6	Broken drive chain and disconnected motor device	☐	☐	☐
2.7	Reversal stop switch	☐	☐	☐
2.8	Broken step/pallet chain switch	☐	☐	☐
2.9	Step/pallet upthrust device	☐	☐	☐
2.10	Missing step/pallet device	☐	☐	☐
2.11	Step/pallet level device	☐	☐	☐
2.12	Steps/pallets, step/pallet chains and trusses	☐	☐	☐
2.13	Handrails	☐	☐	☐
2.14	Name plate	☐	☐	☐
2.15	Response to smoke detectors	☐	☐	☐
2.16	Log Card	☐	☐	☐
2.17	Pit Cleanliness	☐	☐	☐
2.18	Inspection box	☐	☐	☐

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Lift and Escalators Sectional Committee, ETD 25

Organization	*Representative(s)*
Central Public Works Department (CPWD), New Delhi	Shri C. K. Varma (***Chairman***)
Chief Electrical Inspector, Maharashtra	Shri S. R. Bagde
Chief Electrical Inspectorate, Tamil Nadu	Shri T. Al. Tenappan Shri D. Karthikeyan (*Alternate*)
Chief Electrical Inspectorate, Maharashtra	Shri N. G. Behram Shri V. H. Shahare (*Alternate* I) Shri D. M. Nikhate (*Alternate* II)
Chief Electrical Inspectorate, Energy & Petrochemical Department Government of Gujarat	Shri Haiderali H Khoja Shri Ashwin B. Chaudhary (*Alternate* I) Shri Gopal K. Prajapati (*Alternate* II)
Electrical Inspectorate, Labour Deptt, Govt of NCT of Delhi	Shri Mukesh Kumar Sharma Shri Jogender Singh (*Alternate*)
Delhi Metro Rail Corporation Limited	Shri Manuj Singhal Shri Manjeet Kumar (*Alternate* I) Shri Sumit Kumar Sharma (*Alternate* II)
Maharashtra Industrial Development Corporation (MIDC) Fire Service	Shri Santosh S. Warick
Electrical Contractors Association of Maharashtra	Shri Anil Gachke
Fujitec India Pvt Ltd, Tamil Nadu	Shri S. P. Rao Shri R. Rajesh (*Alternate* I) Shri Arunsankar M. S. (*Alternate* II)
Johnson Lifts Pvt Limited, Chennai	Shri T. Subramanian Shri V. Karthikeyan (*Alternate*)
Kone Elevator India Private Limited, Chennai	Shri Tipnis P. M. Shri P. Gurumoorthy (*Alternate* I) Shri U. Viswanathan (*Alternate* II)
Lerch Bates Private Limited, Mumbai	Shri Sumeet Majumdar Shri Prashant Kulkarni (*Alternate*)
Otis Elevator Company (India) Limited, Mumbai	Shri Vijay Jaychandran Shri Abhijit Dandekar (*Alternate* I) Shri H. N. Prashanth (*Alternate* II)
Schindler India Pvt Ltd, Mumbai	Shri Nimish Deshpande Shri Ronnie Dante (*Alternate* I) Shri Nitin Kadam (*Alternate* II)
Tak Consulting Private Limited, Mumbai	Shri Tak Mathews Shri William Rebello (*Alternate*)
Thyssenkrupp Elevator India Pvt Ltd, Mumbai	Shri Vishnu Parashar Shri Rajesh Joshi (*Alternate*)
BIS Directorate General	Shri Rajeev Sharma, Scientist 'F' and Head (ETD) [Representing Director General (*Ex-officio*)]

Member Secretary

Ms Meghna Mudgal
Scientist 'C' (ETD), BIS

(*Continued from second cover*)

The composition of the Committee, responsible for the formulation of this standard is given at Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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